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NASA Support to Planetary Radar

NASA has supported the development and utilization of planetary radar for many decades, both at its own Goldstone facility in California (DSS-14) and at the Arecibo Radio Telescope in Puerto Rico. NASA was involved, both technically and financially, in the original installation of S-band radar capability at Arecibo in the early 70's and then in its upgrade in the 90's. The radar has been used to investigate the obscured surfaces of planetary bodies such as Venus, look for icy surfaces on the Moon, Mercury and other planetary bodies, detect the subtle variations in planet rotation that indicate molten cores such as for Mercury, and in more recent years to investigate and characterize the asteroids and comets that may come near the Earth, the so-called Near Earth Objects (NEOs). See http://echo.jpl.nasa.gov for further information.

NASA is intensely interested in maintaining planetary radar capability at not just Goldstone but also at Arecibo. The capability at these two facilities is in many ways complementary and mutually supporting. Observation of planetary objects by both facilities can often reveal details of characterization that may be missed in the data from only one. Due to its power and collection area Arecibo has greater usable range, while Goldstone has larger accessible sky coverage due to its greater steer-ability and also provides higher resolution data.

The utilization of planetary radar has become particularly important to the study of the NEOs. No other technique can as rapidly collapse the uncertainties in the object's orbital trajectory to enable improvement of predicting the future path and possible impact possibilities. Object size and spin characteristics may also be accurately detected, as well as the existence of secondary bodies. In the more limited cases where radar imaging can be utilized, shape, composition and other dynamics may be determined, almost to the extent possible by a spacecraft flyby mission.

NASA has therefore agreed to establish continued support to the Arecibo facility expressly for planetary radar capabilities under its Near Earth Object Observation Program. The NASA budget was appropriated $2M in FY2010 for this purpose. It is NASA's intent to continue this level of support, increased at inflation rates, providing the funding is appropriated for this purpose each year by the US Congress. Any institution awarded the cooperative agreement for the management and operation of the National Astronomy and Ionosphere Center (Arecibo Observatory) may then propose to NASA for this planetary radar supplement under the NEO Observation Program. It would be expected in such proposal that at least 500 hours per year of telescope operations would then be allocated to planetary radar research supported by NASA, and at least 300 hours of that dedicated specifically to NEO research. A list of scheduled and historical radar observations of NEOs is available at http://www.naic.edu/~pradar/sched.shtml .

POC for further information is Lindley Johnson, NEO Program Executive, Planetary Science Division, Science Mission Directorate, HQ NASA (lindley.johnson@nasa.gov , or 202-358-2314).